

Modernizing the Corps' Water Control Data System (WCDS)

by

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Corps' Water Control Management Mission

- Regulate River Flow from Corps 500 Reservoirs to Provide National Benefits.
- Achieve Purposes Specified in Authorizing Legislation.
- Water Control Plans are Developed in Coop. with Stakeholders; Documented in Manuals.
- Water Control Plans Revisited at Decade Intervals

Water Control Management Operational Decisions

- **Hundreds of Water Control Management Decisions/Day**
- **Reservoir Releases, Power Generation, Structure Operations – Many Concerns**
- **Other – Flood Fight, Environmental Management, Partnering, Public**
- **Normal Conditions – Routine; Floods/ Emergencies – Complex Process**

Water Control Data System

WCDS is the data acquisition, management, modeling and decision support system that supports the Corps in its water control management mission of regulating more than 500 dam and reservoir projects.

WCDS is a nationwide integrated system of hardware, software, and other resources that acquires, analyzes, and stores data; develops decision support information; and allows user access to any

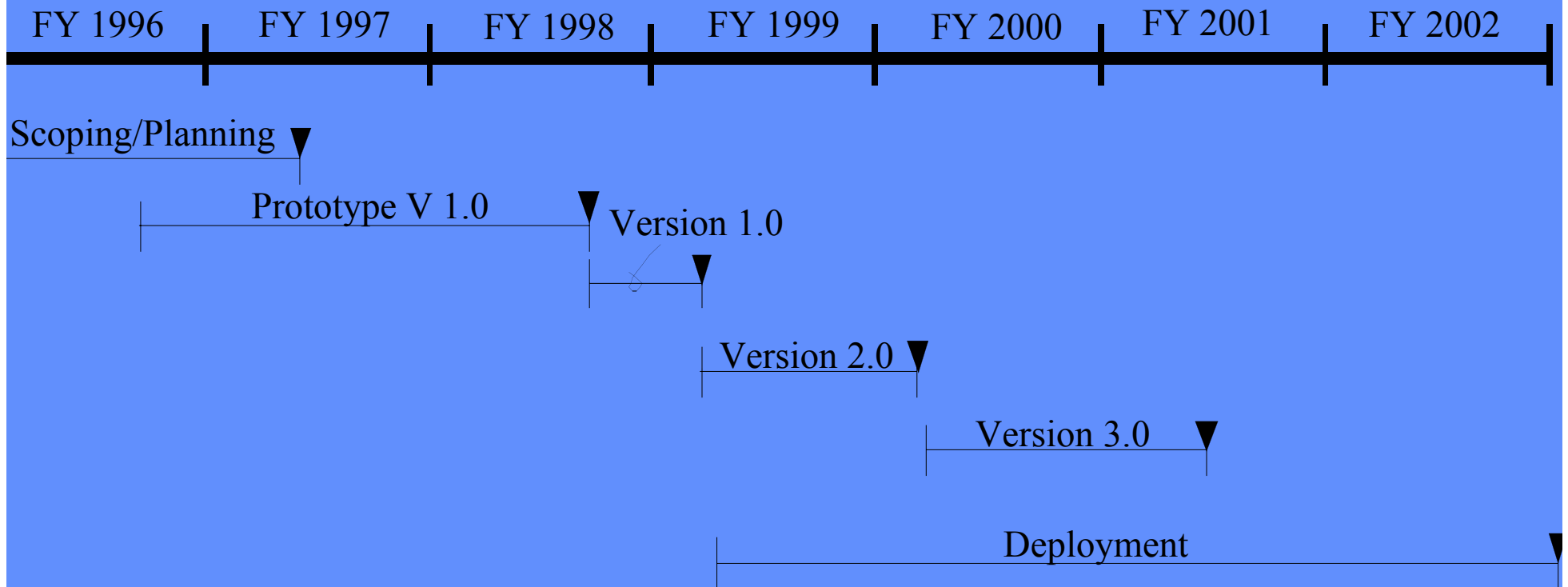
Modernization Needs/ Opportunities

- **New Network and Workstation Technology – Corps Corporate Network in Place.**
- **New Data Sources – GIS, NEXRAD, Satellite Imagery, other Real-time Data.**
- **Improved Data Management Technology – Corps Corporate-wide Commercial DBMS Systems (Oracle).**
- **New Modeling, Forecasting, and Decision Support Tools.**

WCDS Modernization Project

- **Hardware/Software Modernization – Begun 1991.**
- **Hardware Modernization Completed/Ongoing; SUN SPARC Workstations.**
- **Software Modernization; Development 1997 Thru 2001.**
- **Software Deployment – 3 Stages/Version; 1999 Thru 2002.**
- **Official Army AIS Class IV System – Proponent (CW), PM (CECW–EH), SD (HEC), Teams**

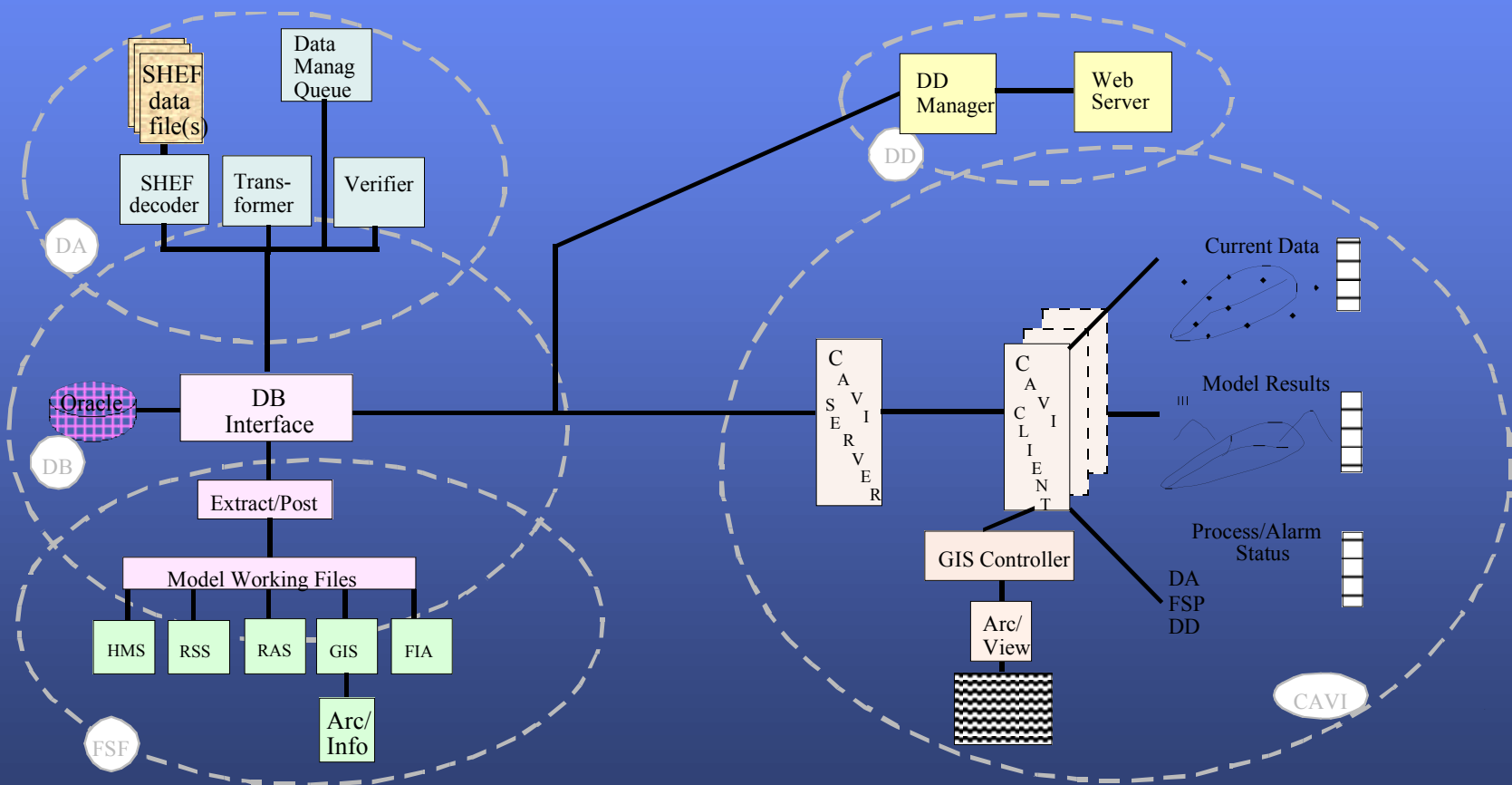
WCDS Timeline/Deployment Schedule

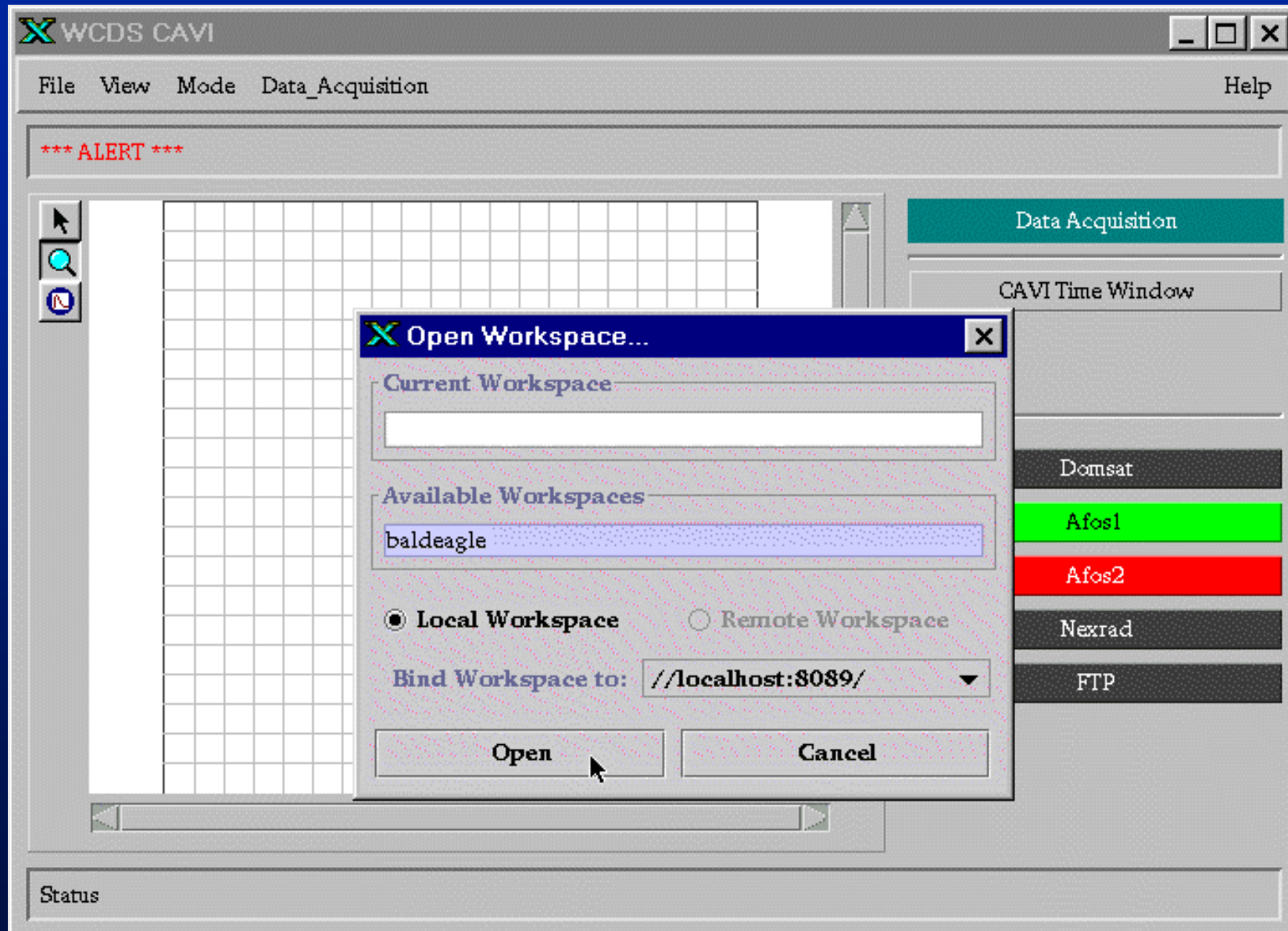


WCDS Software Suite

- **Data Acquisition/Validation – in Real Time.**
- **Data Dissemination – Web-based Technology.**
- **Database System – Oracle & Model Support.**
- **Forecasting, Modeling and Decision Support.**
- **Control And Visualization.**

WCDS System Design



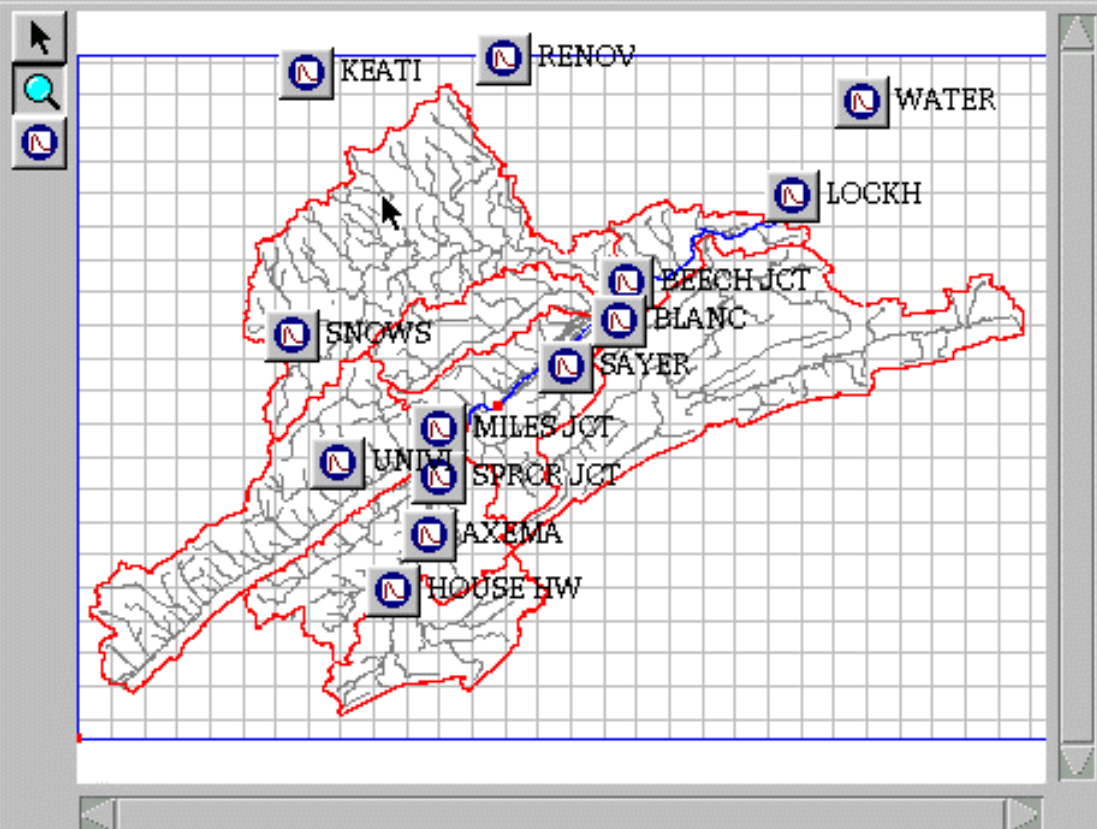


WCDS CAVI - baldeagle

File View Mode Data_Acquisition

Help

*** ALERT ***



Data Acquisition

CAVI Time Window

Start Time: 21 November 1993, 06:00

End Time: 3 December 1993, 06:00

Domsat

Afos1

Afos2

Nexrad

FTP

Status

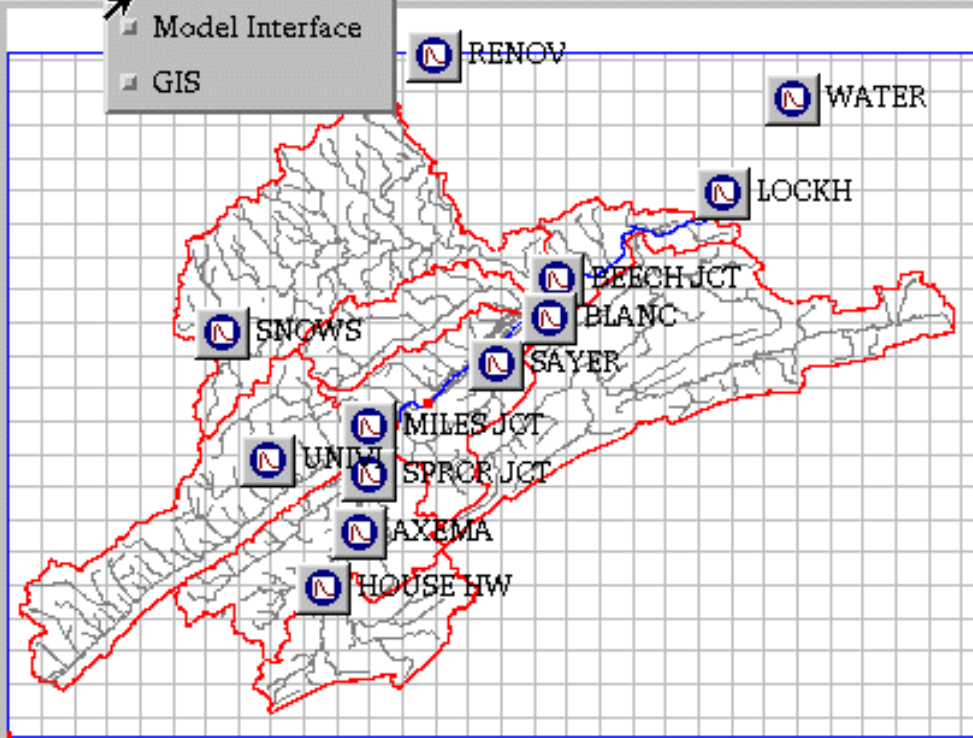
WCDS CAVI - baldeagle

File View Mode Data_Acquisition

Help

*** ALERT ***

- ☒ Data Acquisition
- ☒ Data Visualization
- ☒ Model Interface
- ☒ GIS



Data Acquisition

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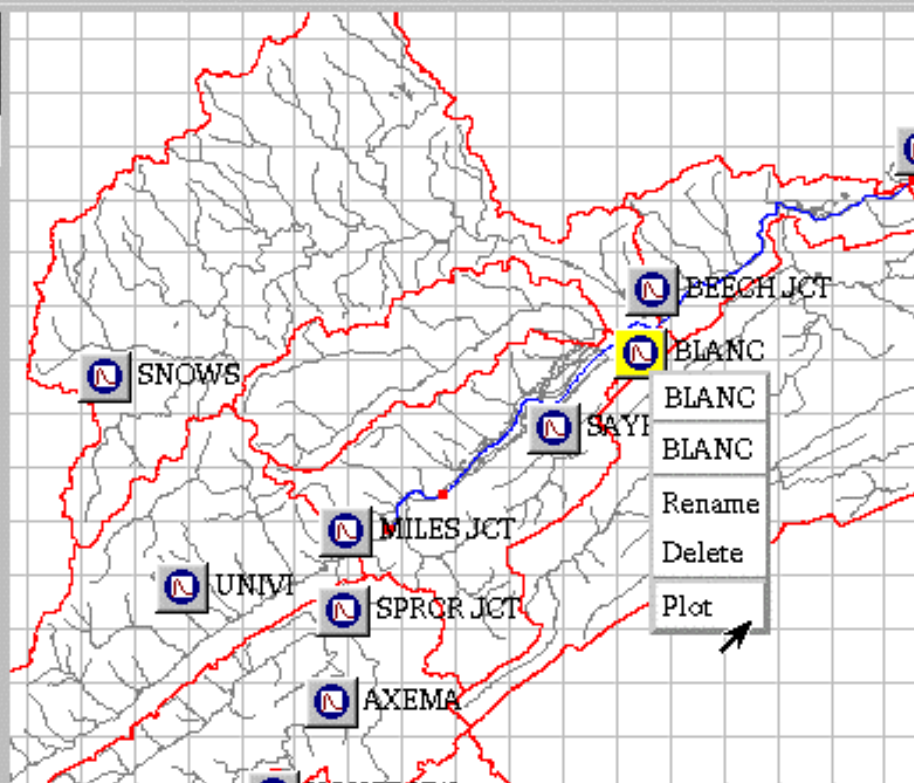
Status

WCDS CAVI - baldeagle

File View Mode Data_Visualization

Help

*** ALERT ***



Data Visualization

CAVI Time Window

Start Time: 21 November 1993, 06:00

End Time: 3 December 1993, 06:00

Data Source...

mastdb1.dss,OBS
mastdb1.dss,NCDC
mastdb1.dss,COMP

Parameters...

FLOW,1 HOUR
PRECIP,1 HOUR

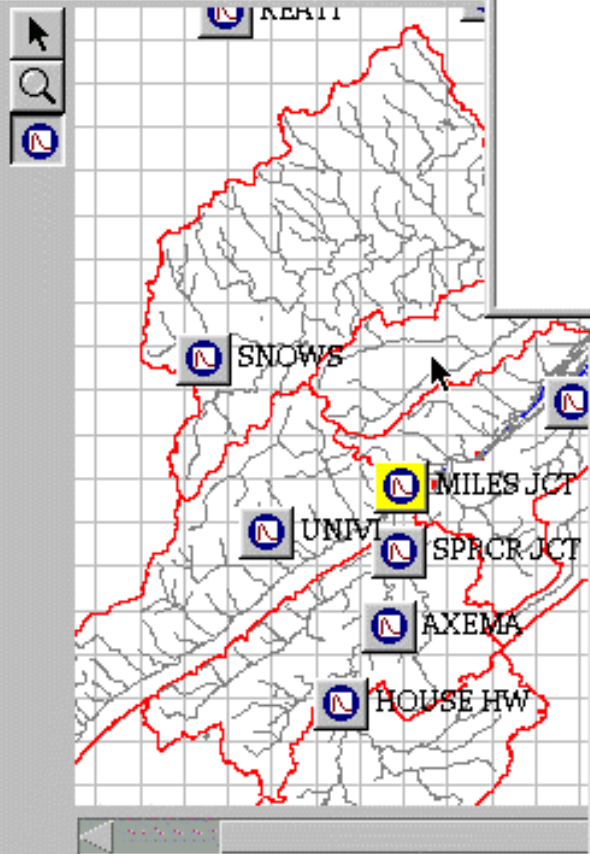
Data List Selector

Status

WCDS CAVI - baldeagle

File View Mode Data_Visualiza

*** ALERT ***

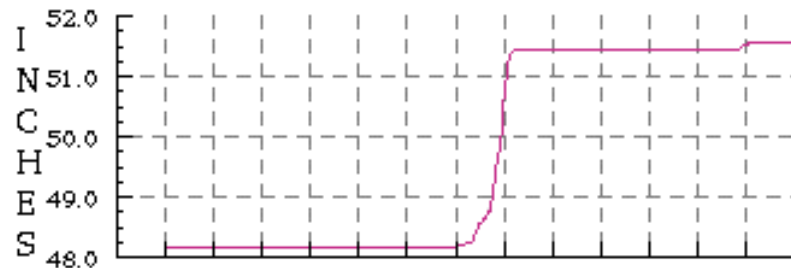


Status

Bald Eagle Creek UNIV

File Edit Math

Bald Eagle Creek UNIV

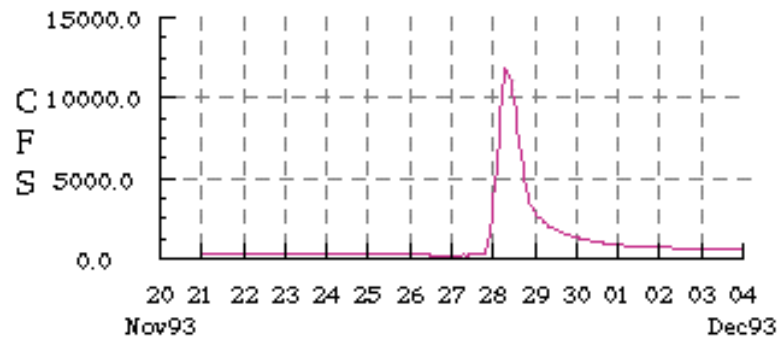


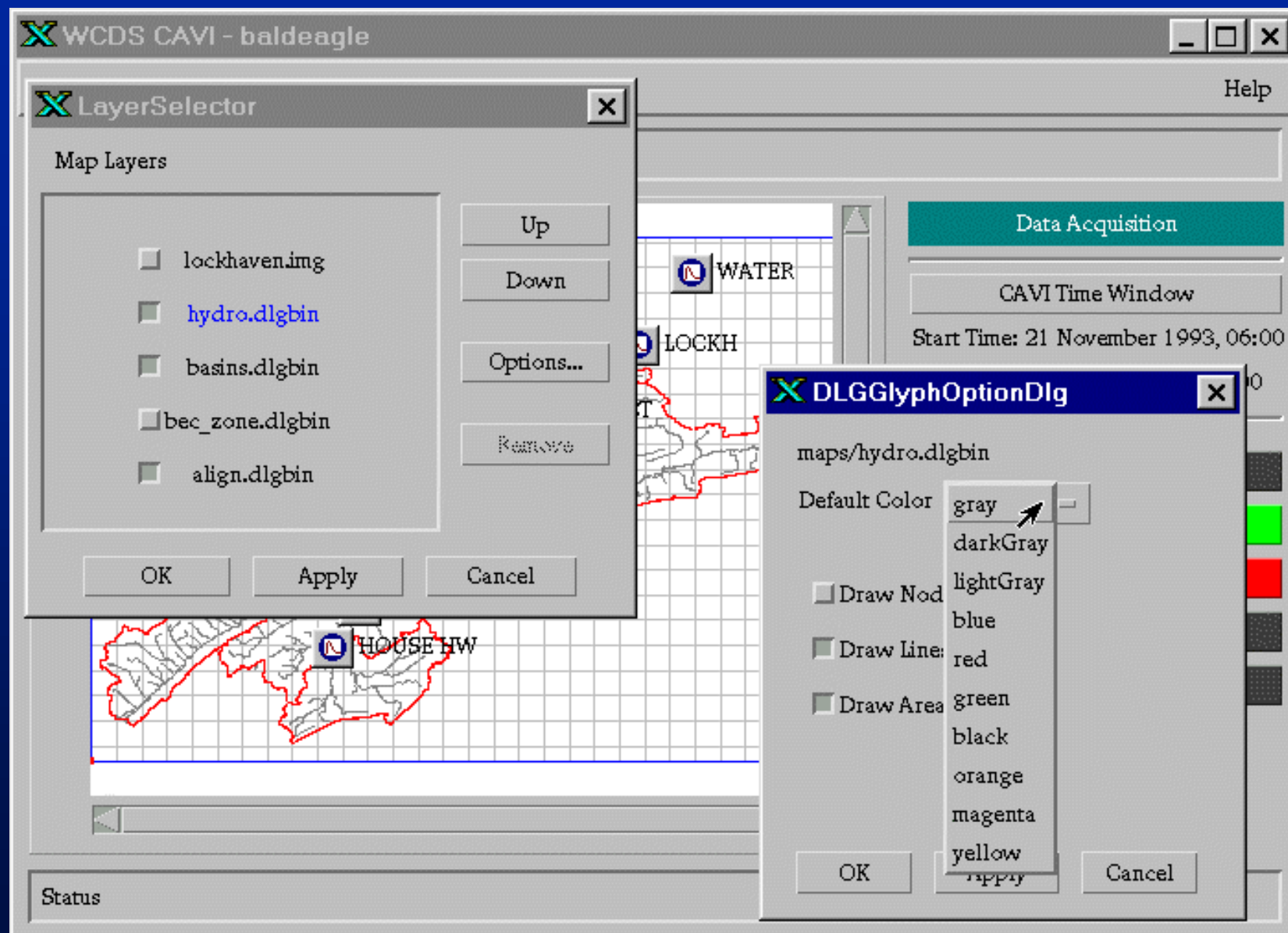
Data Source...

Bald Eagle Creek MILES JCT

File Edit Math

Bald Eagle Creek MILES JCT





WCDS CAVI - baldeagle

File View Mode Data_Visualization

Help

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Data Visualization

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Data Source...

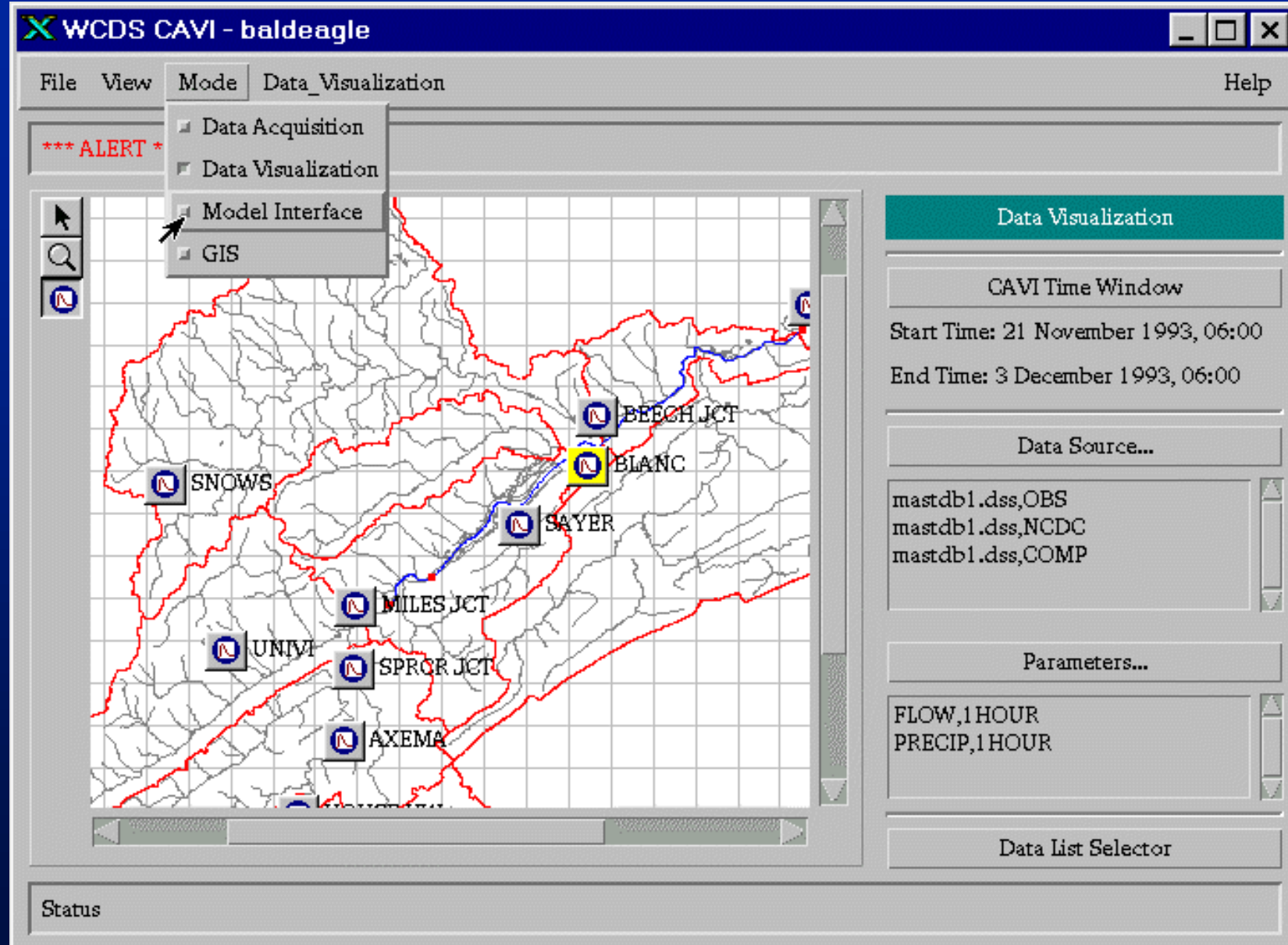
mastdb1.dss,OBS
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FLOW,1 HOUR
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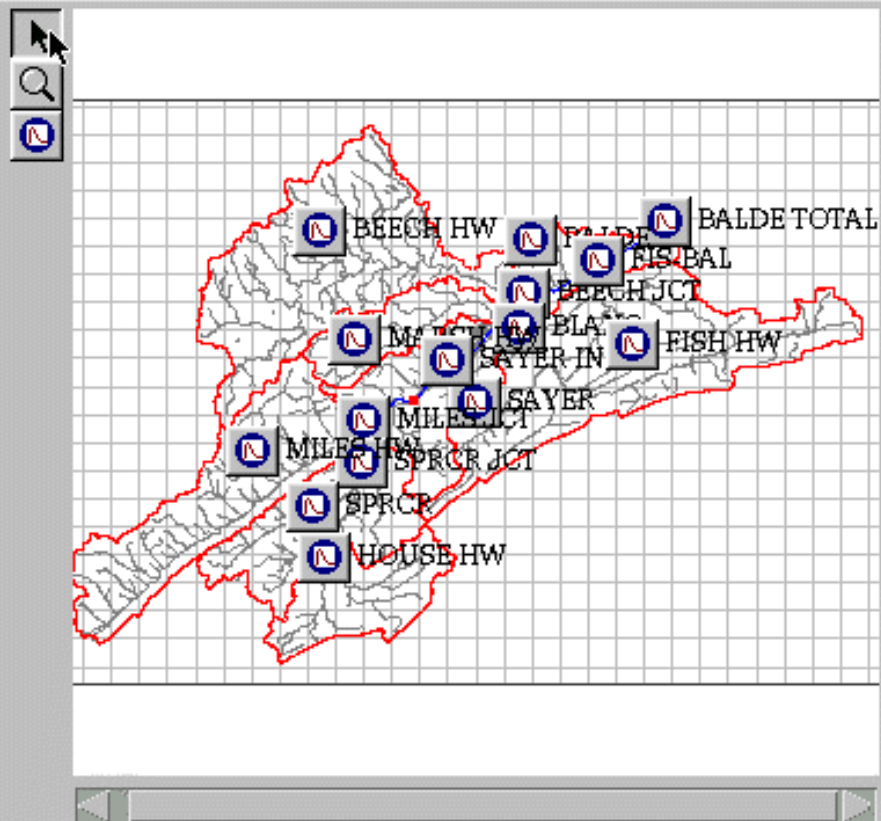


WCDS CAVI - baldeagle

File View Mode Model_Interface

Help

*** ALERT ***



Model Interface

Default Time Window

Alternative Configuration

Forecast Run

1998.06.12-0000

Execute

Lookback Time: 29 May 1998, 00:00

Forecast Time: 12 June 1998, 00:00

End of Forecast: 12 July 1998, 00:00

Selected Alternatives:

Plot Parameters...

Post to Database

Post to Web

Status

WCDS CAVI - baldeagle

File View Mode Model_Interface

Help

*** ALERT ***



Status

Forecast Run Control

Name: 1993.11.28-0600

Description: description

Lookback Time: 26Nov1993, 0000

Forecast Time: 28Nov1993, 0600

End of Forecast: 07Dec1993, 0000

Forecast Directory: /wcds/forecast/1993.11.28-0600/baldeagle

Forecast Alternatives:

base0600

qpf0600

RSS-RAS

Execute Now

Schedule

Close

Model Interface

ult Time Window

ative Configuration

-0600

Execute

me: 26Nov1993, 0000

e: 28Nov1993, 0600

cast: 07Dec1993, 0000

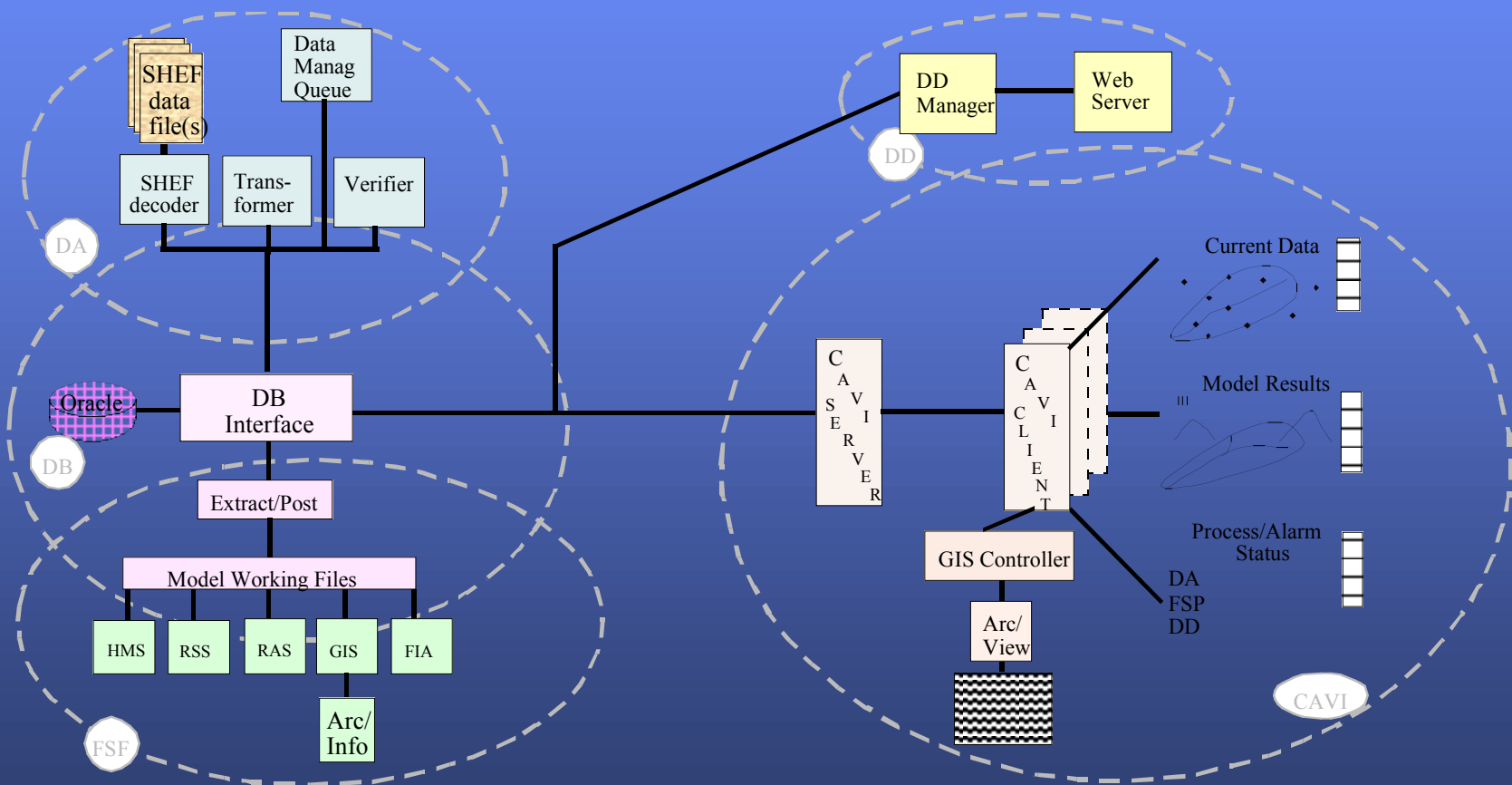
alternatives:

ot Parameters...

st to Database

Post to Web

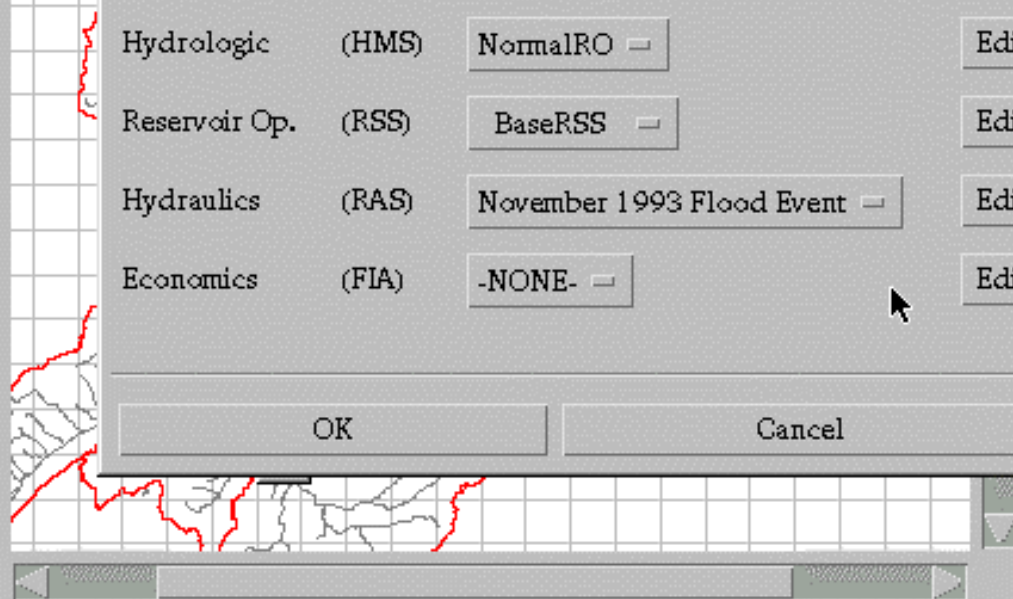
WCDS System Design



WCDS CAVI - baldeagle

File View

*** ALERT ***



Status

Forecast Alternative Configuration

New Alt. Name

Add Alt.

Forecast Alt.

base0600

Remove Alt.

Alt. Description

Base condition with no additional precipitation oc

Precipitation (MFP)

-NONE-

Edit

Hydrologic (HMS)

NormalRO

Edit

Reservoir Op. (RSS)

BaseRSS

Edit

Hydraulics (RAS)

November 1993 Flood Event

Edit

Economics (FIA)

-NONE-

Edit

OK

Cancel

Help

Model Interface

Default Time Window

Alternative Configuration

Forecast Run

1993.11.28-0600

Execute

Lookback Time: 26Nov1993, 0000

Forecast Time: 28Nov1993, 0600

End of Forecast: 07Dec1993, 0000

Selected Alternatives:

Plot Parameters...

Post to Database

Post to Web

Forecasting/Decision Support

- **Precipitation** – Real-time gage, NEXRAD, QPF, estimate/projection; gridded/spatial patterns.
- **Flow** – HEC-HMS, grid-based continuous precip./ runoff analysis, alternative scenarios.
- **Stage** – HEC-RAS, steady & unsteady flow, full suite of hydraulic structures.
- **Reservoir** – HEC-RSS, rule-based editor,

X HFP [minimize] [maximize] [close]

Edit

Alternative: HighRO ▾

Description: Create a condition with high runoff ...

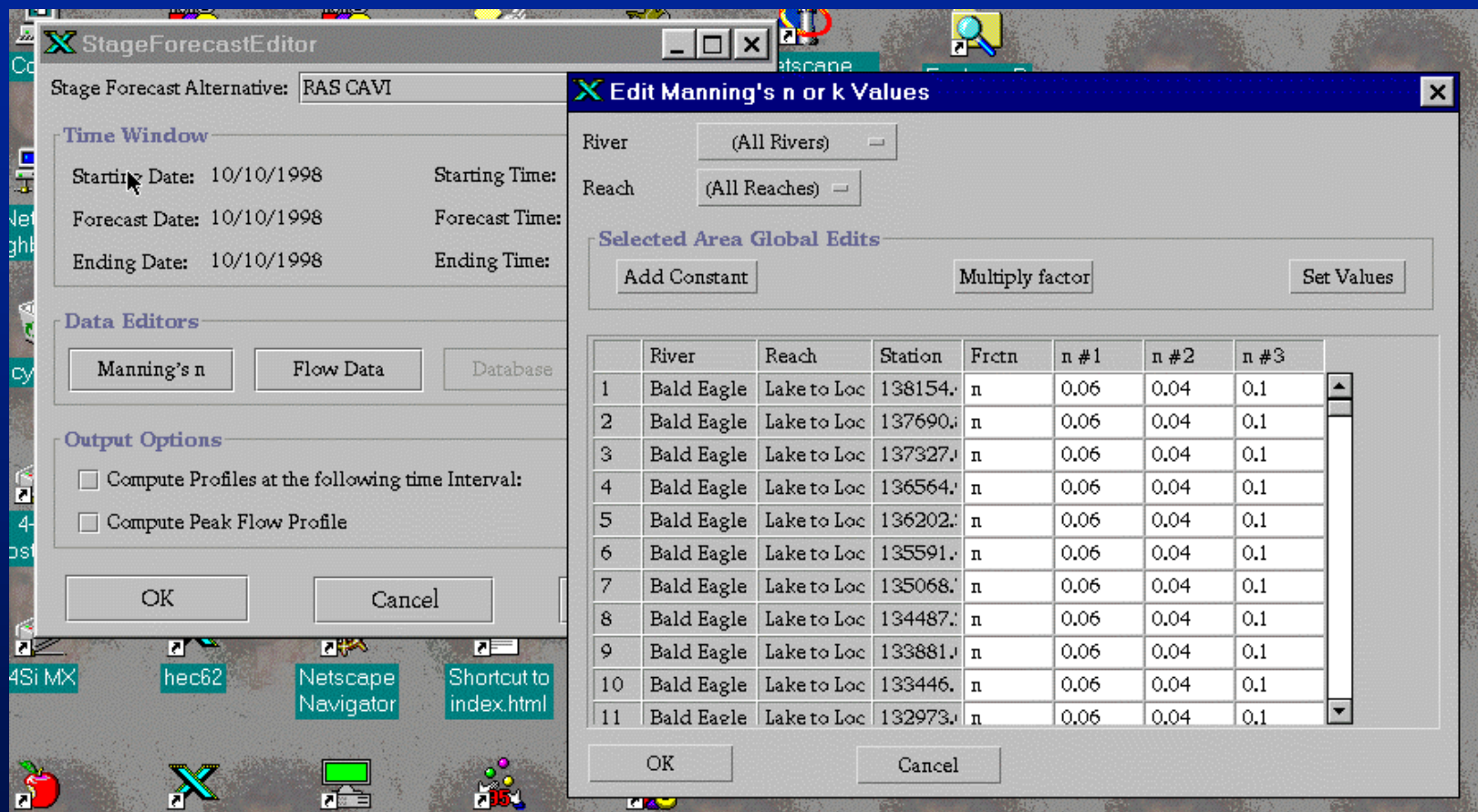
Basin Model: BaldEagle ▾

Loss Parameters | Baseflow Parameters | Blending

Loss Parameter Zone Configuration: LRzones ▾

	Increase (+) Decrease (-) Initial Moisture Content (mm)	Constant Loss Rate (mm/hr)
LRzoneL ₁	0.0	0.1
LRzoneU ₁	0.0	0.1

OK Apply Cancel

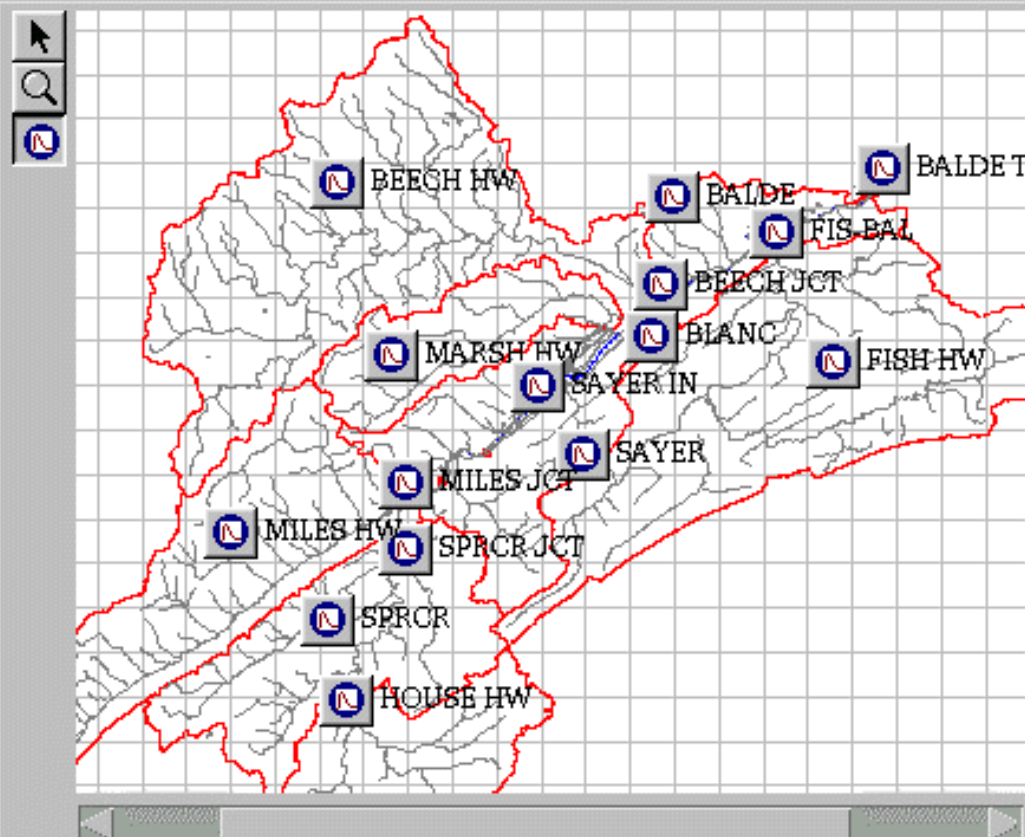


WCDS CAVI - baldeagle

File View Mode Model_Interface

Help

*** ALERT ***



Model Interface

Default Time Window

Alternative Configuration

Forecast Run

1993.11.28-0600

Execute

Lookback Time: 26Nov1993, 0000

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End of Forecast: 07Dec1993, 0000

Selected Alternatives:

Plot Parameters...

Post to Database

Post to Web

Status

WCDS CAVI - baldeagle

File View Mode Model_Interface

Help

*** ALERT ***



Forecast Run Control

Name: 1993.11.28-0600

Compute

RSS Message Output

Performing forecast for base0600
No MFP alternative selected
Running HFP alternative NormalRO
Running RSS alternative BaseRSS
Initializing Run.

Starting Date and Time: 06:00
Ending Date and Time: 00:00
Lookback Period: 0
Time Step: 1.0

0%

Close

Execute Now

Schedule

Close

Status

Model Interface

ult Time Window

ative Configuration

-0600

Execute

me: 26Nov1993, 0000

e: 28Nov1993, 0600

cast: 07Dec1993, 0000

alternatives:

pt Parameters...

st to Database

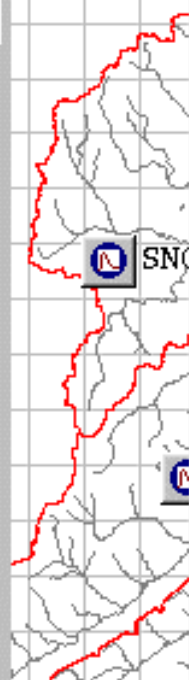
Post to Web

WCDS CAVI - baldeagle

File View Mode Data_Visualization

Help

*** ALERT ***

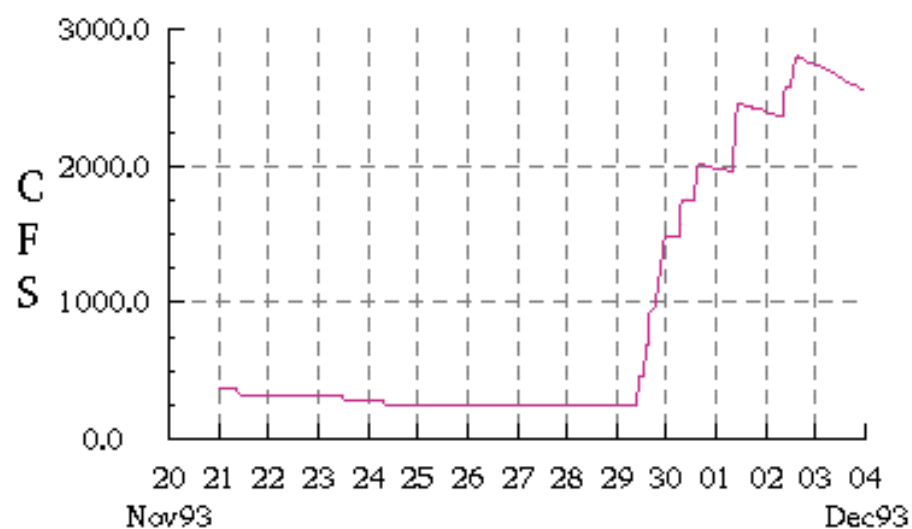


Status

Bald Eagle Creek BLANC

File Edit Math

Bald Eagle Creek BLANC

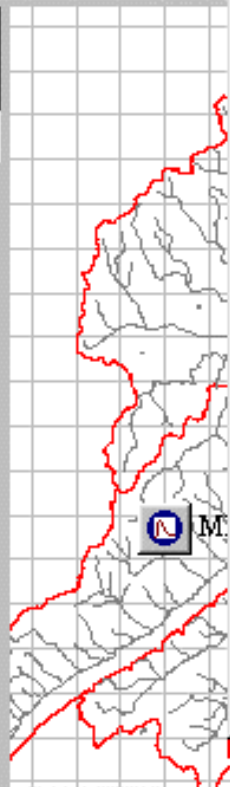


BLANC FLOW OBS

WCDS CAVI - bald eagle

File View Mode

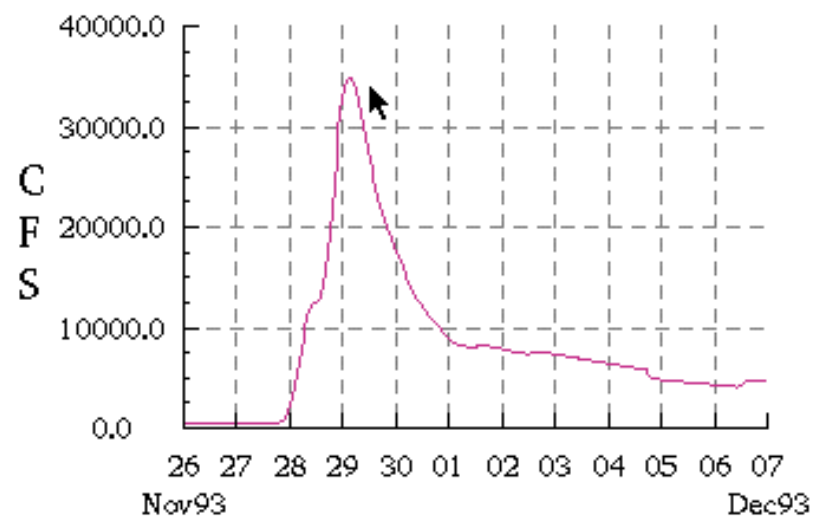
*** ALERT ***



Bald Eagle Creek BALDE TOTAL

File Edit Math

Bald Eagle Creek BALDE TOTAL



BALDE TOTAL FLOW QPF0600

Help

Interface

Window

Configuration

Execute

Nov1993, 0000

Nov1993, 0600

Dec1993, 0000

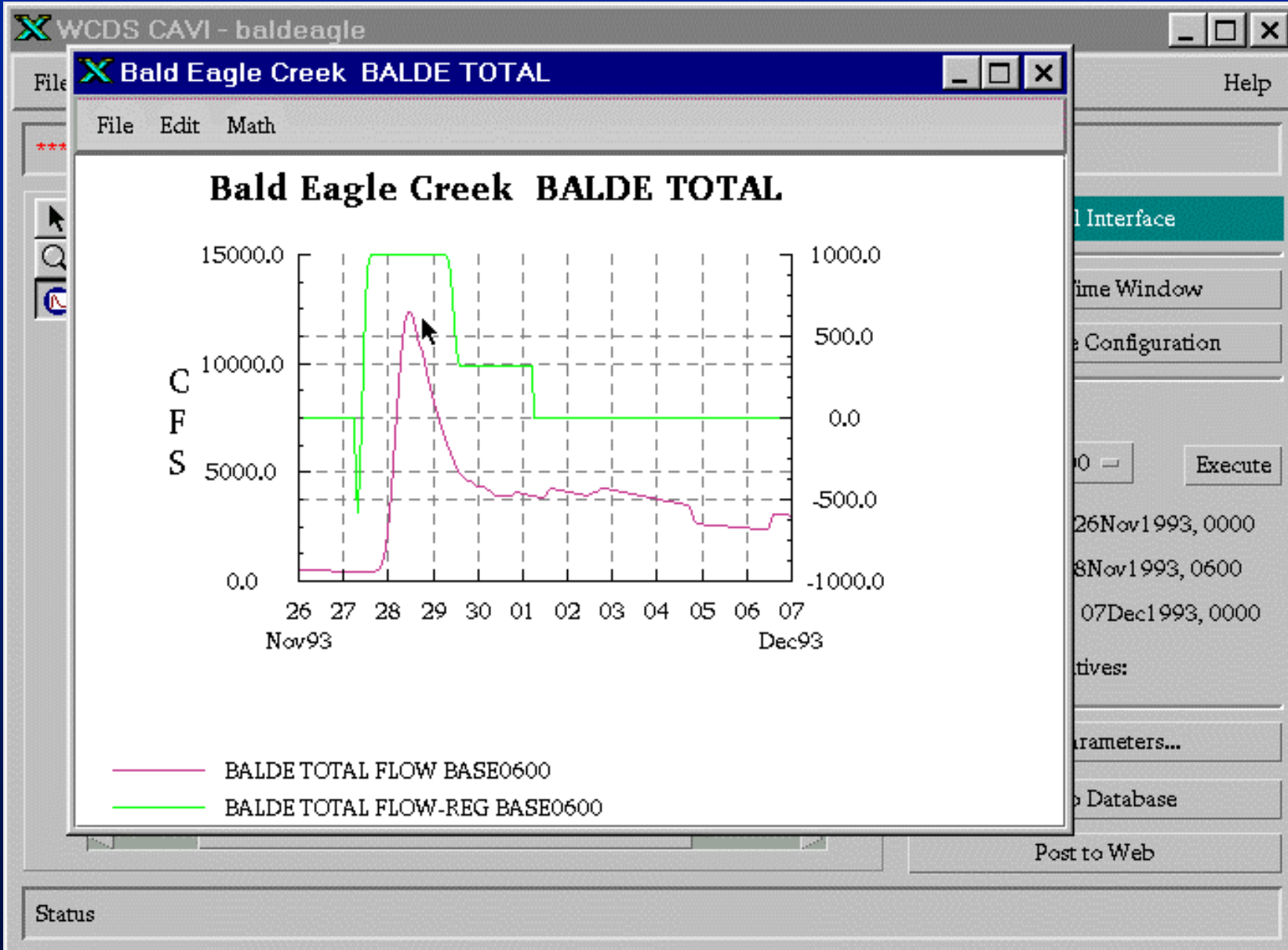
es:

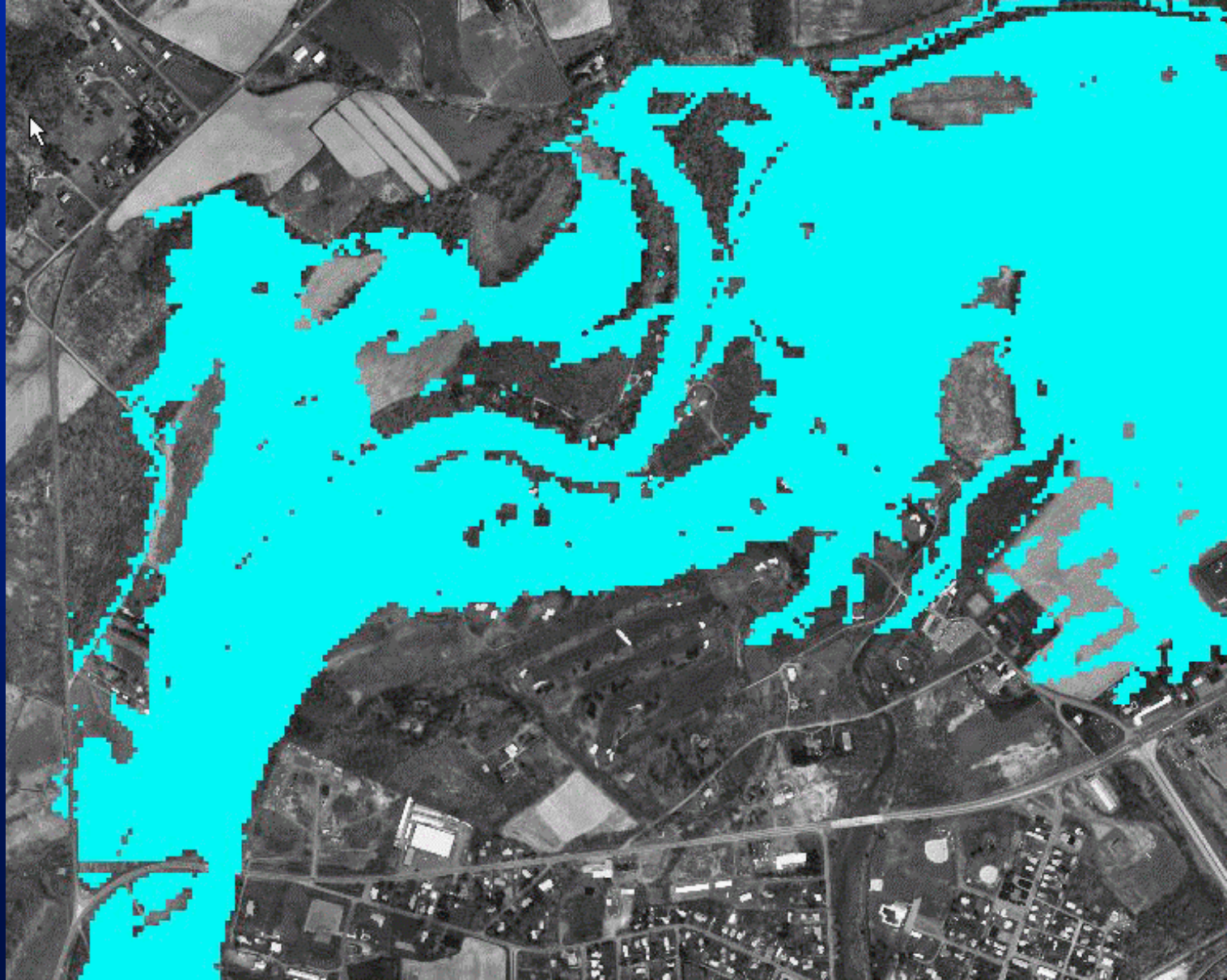
meters...

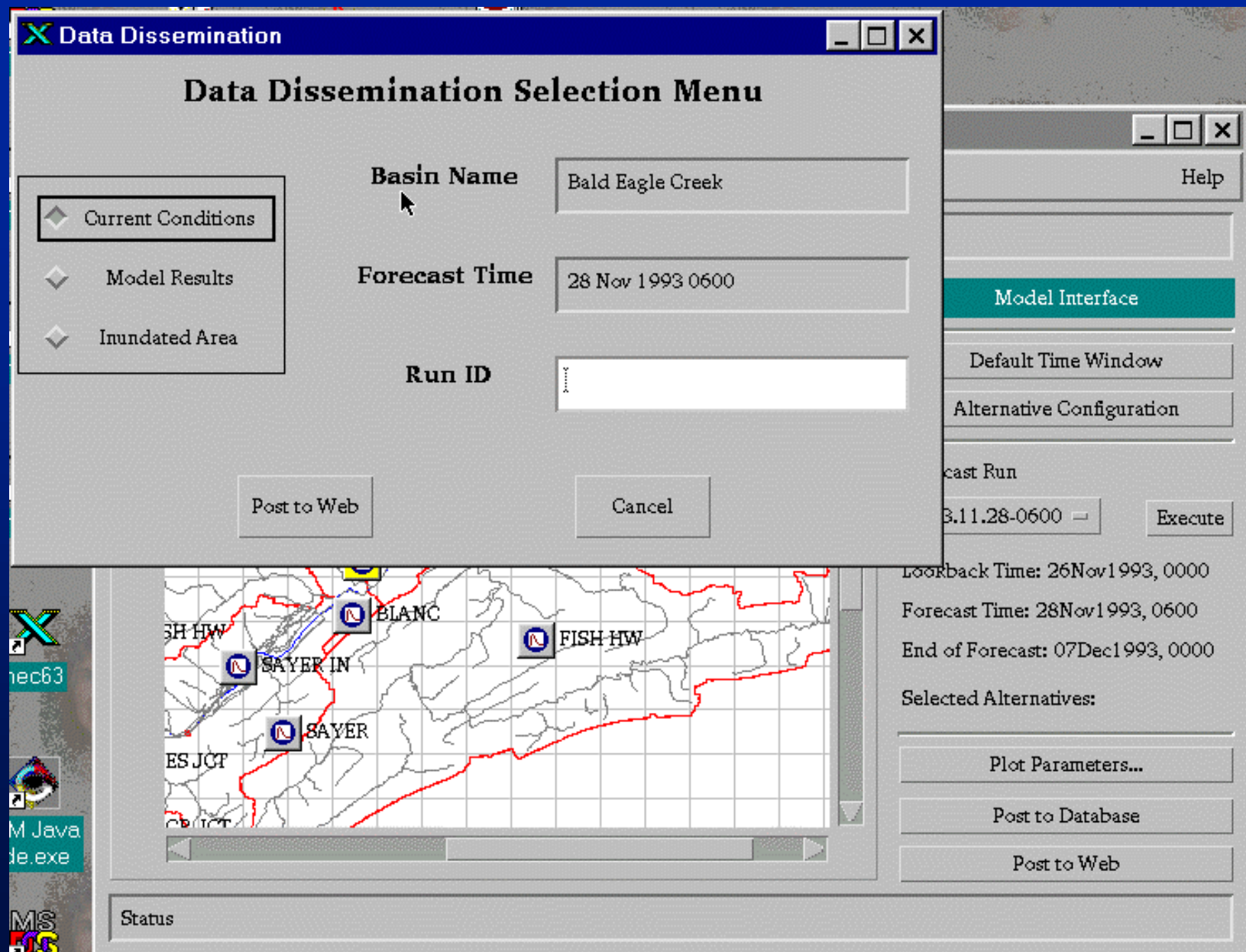
Post to Database

Post to Web

Status







Flood Damage Reduction and Water Control Management

by

**Darryl W. Davis, Director
U.S. Army Corps of Engineers
Hydrologic Engineering
Center**

Davis, California, USA

Corps Flood Damage Reduction Mission

- **Planning, Design, Construction of Projects.**
 - **Dams, Levees, Flood Walls, Divisions, Non-structural Measures.**
- **Technical Assistance in Flood Plain Management.**
- **Water Control Management of Completed Projects**

WCDS and Planning, Other Studies

- **WCD Data, real-time and historical, will exist/ accessed from Corps standard Oracle data base.**
- **‘Watershed’ version proposed for development.**
 - **Project begin 2000, Version 1.0 end 2001,**
 - **Disconnect data stream and Oracle, replace with HEC-DSS, develop planning/studies GUI,**
 - **Revise Internet posting/dissemination features and links for Watersheds, study**